Claims

1. A method for identifying a target for analgesic therapy, said method comprising the steps of:

(a) providing a first and a second non-human subject, wherein said subjects have a genetic-based difference in nociception;

(b) performing an fMRI on the brain of said first subject during or following administration of a painful stimulus;

(c) performing an fMRI on the brain of said second subject during or following administration of said painful stimulus; and

(d) comparing the results of said fMRI on the brain of said first subject with the results of said fMRI on the brain of said second subject to identify a brain region that is differentially activated in response to said painful stimulus, said brain region being a target for analgesic therapy.

2. The method of claim 1, wherein said method further comprises the steps of:

(e) administering an analgesic;

(f) performing a second fMRI on the brain of said first subject during or following a second administration of said painful stimulus;

(g) performing a second fMRI on the brain of said second subject during or following a second administration of said painful stimulus; and

(h) comparing the results of said second fMRIs to identify a brain region that is differentially activated in response to said painful stimulus in the presence of said analgesic, said brain region being a target for analgesic therapy.

3. The method of claim 1, wherein, prior to, simultaneous with, or following administration of said painful stimulus, an analgesic is administered to said first subject and said second subject and, in step (d), said brain region is differentially activated in response to said painful stimulus, said analgesic, or both.

4. The method of claim 1, wherein said method further comprises the step of:

(e) assessing gene expression in said target brain region identified in step (d) to further identify a gene or gene product that is differentially expressed, wherein said differentially expressed gene or gene product is a target for analgesic therapy.

5. The method of claim 2, wherein said method further comprises the step of:

(i) assessing gene expression in said target brain region identified in step (h) to further identify a gene or gene product that is differentially expressed, wherein said differentially expressed gene or gene product is a target for analgesic therapy.

6. The method of claim 1, wherein said first subject and said second subject are rodents.

7. The method of claim 6, wherein said rodents are of different strains.

8. The method of claim 6, wherein at least one of said rodents is selected from the group consisting of mice of the strains 129P3, A, AKR, BALB/c, C3H/He, C57BL/6, C57BL/10, C58, CBA, DBA/2, RIIIS, SM, LP, SJL, and SWR.

9. The method of claim 1, wherein said painful stimulus is an acute pain stimulus.

10. The method of claim 1, wherein said painful stimulus is a chronic pain stimulus.

11. The method of claim 10, wherein said chronic pain stimulus is neuropathic pain, arthritic pain, or cancer pain.

12. The method of claim 1, wherein said painful stimulus is a stimulus that induces a hypersensitive response.

13. The method of claim 1, wherein said first subject and said second subject are conscious.

14. A method for identifying a target for analgesic therapy, said method comprising the steps of:

(a) administering an analgesic to a first and a second non-human subject, wherein said subjects have a genetic-based difference in nociception;

(b) performing a first fMRI on the brain of said first subject during or following administration of said analgesic;

(c) performing a first fMRI on the brain of said second subject during or following administration of said analgesic; and

(d) comparing the results of said fMRI on the brain of said first subject with the results of said fMRI on the brain of said second subject to identify a brain region that is differentially activated in response to said analgesic administration, said brain region being a target for analgesic therapy.

15. The method of claim 14, wherein said method further comprises the step of:

(e) assessing gene expression in said target brain region identified in step (d) to further identify a gene or gene product that is differentially expressed, wherein said differentially expressed gene or gene product is a target for analgesic therapy.

16. The method of claim 14, wherein said first subject and said second subject are rodents.

17. The method of claim 16, wherein said rodents are of different strains.

18. The method of claim 16, wherein at least one of said rodents is selected from the group consisting of mice of the strains 129P3, A, AKR, BALB/c, C3H/He, C57BL/6, C57BL/10, C58, CBA, DBA/2, RIIIS, SM, LP, SJL, and SWR.

19. The method of claim 14, wherein said first subject and said second subject are conscious.

20. The method of claim 14, wherein said analgesic is a channel blocker, antidepressant, μ-opioid receptor agonist, κ-opioid receptor agonist, cannabinoid receptor agonist, nicotinic receptor agonist, or adrenergic receptor agonist.

21. The method of claim 14, wherein said analgesic is morphine.

22. A method for identifying a target for analgesic therapy, said method comprising the steps of:

(a) providing a first and a second non-human subject, said second non-human subject differing from said first non-human subject in its expression of a transgene of interest;

(b) performing an fMRI on the brain of said first subject during or following administration of said painful stimulus;

(c) performing an fMRI on the brain of said second subject during or following administration of a painful stimulus; and

(d) comparing the results of said fMRI on the brain of said first subject with the results of said fMRI on the brain of said second subject, wherein non-identical results indicate that said transgene of interest or its product is a target for analgesic therapy.

23. The method of claim 22, wherein said method further comprises the steps of:

(e) administering an analgesic;

(f) performing a second fMRI on the brain of said first subject during or

following a second administration of a painful stimulus;

(g) performing a second fMRI on the brain of said second subject during or following a second administration of a painful stimulus; and

(h) comparing the results of said second fMRIs to identify a brain region that is differentially activated in response to said painful stimulus in the presence of said analgesic, said brain region being a target for analgesic therapy.

24. The method of claim 22, wherein, prior to, simultaneous with, or following administration of said painful stimulus, an analgesic is administered to said first subject and said second subject and, in step (d), said brain region is differentially activated in response to said painful stimulus, said analgesic, or both.

25. The method of claim 22, wherein said transgene is expressed in the central nervous system.

26. The method of claim 22, wherein said subjects are rodents.

27. The method of claim 22, wherein said painful stimulus is an acute pain stimulus.

28. The method of claim 22, wherein said painful stimulus is a chronic pain stimulus.

29. The method of claim 28, wherein said chronic pain stimulus is neuropathic pain, arthritic pain, or cancer pain.

30. The method of claim 22, wherein said painful stimulus is a stimulus that induces a hypersensitive response.

31. The method of claim 22, wherein said first subject and said second subject are conscious.

32. A method for identifying a target for analgesic therapy, said method comprising the steps of:

(a) providing a first and a second non-human subject, said second non-human subject differing from said first non-human subject in that at least one endogenous allele of a gene of interest is functionally disrupted or deleted;

(b) performing an fMRI on the brain of said first subject during or following administration of a painful stimulus;

(c) performing an fMRI on the brain of said second subject during or following administration of said painful stimulus; and

(d) comparing the results of said fMRI on the brain of said first subject with the results of said fMRI on the brain of said second subject, wherein non-identical results indicate that said gene of interest or its product is a target for analgesic therapy.

33. The method of claim 32, wherein said method further comprises the steps of:

(e) administering an analgesic;

(f) performing a second fMRI on the brain of said first subject during or following a second administration of said painful stimulus;

(g) performing a second fMRI on the brain of said second subject during or following a second administration of said painful stimulus; and

(h) comparing the results of said second fMRIs to identify a brain region that is differentially activated in response to said painful stimulus in the presence of said analgesic, said brain region being a target for analgesic therapy.

34. The method of claim 32, wherein, prior to, simultaneous with, or following administration of said painful stimulus, an analgesic is administered to said first subject and said second subject and, in step (d), said brain region is differentially activated in response to said painful stimulus, said analgesic, or both.

35. The method of claim 32, wherein, in said second non-human subject, both endogenous alleles of said gene of interest are functionally disrupted or deleted.

36. The method of claim 32, wherein said first subject and said second subject are rodents.

37. The method of claim 32, wherein said painful stimulus is an acute pain stimulus.

38. The method of claim 32, wherein said painful stimulus is a chronic pain stimulus.

39. The method of claim 38, wherein said chronic pain stimulus is neuropathic pain, arthritic pain, or cancer pain.

40. The method of claim 32, wherein said painful stimulus is a stimulus that induces a hypersensitive response.

41. The method of claim 32, wherein said first subject and said second subject are conscious.

42. A method for identifying a target for analgesic therapy, said method comprising the steps of:

(a) administering an analgesic to a first and a second non-human subject, said second non-human subject differing from said first non-human subject in its expression of a transgene of interest;

(b) performing an fMRI on the brain of said first subject following administration of said analgesic;

(c) performing an fMRI on the brain of said second subject following administration of said analgesic; and

(d) comparing the results of said fMRI on the brain of said first subject with the results of said fMRI on the brain of said second subject, wherein non-identical results indicate that said transgene of interest or its product is a target for analgesic therapy.

43. The method of claim 42, wherein said first subject and said second subject are rodents.

44. The method of claim 42, wherein said analgesic is a channel blocker, antidepressant, μ-opioid receptor agonist, κ-opioid receptor agonist, cannabinoid receptor agonist, nicotinic receptor agonist, or adrenergic receptor agonist.

45. The method of claim 42, wherein said analgesic is morphine.

46. The method of claim 42, wherein, prior to step (a), said first and said second non-human subjects are administered a painful stimulus.

47. The method of claim 42, wherein said first subject and said second subject are conscious.

48. A method for identifying a target for analgesic therapy, said method comprising the steps of:

(a) administering an analgesic to a first and a second non-human subject, said second non-human subject differing from said first non-human subject in that at least one endogenous allele of a gene of interest is functionally disrupted or deleted;

(b) performing an fMRI on the brain of said first subject following administration of said analgesic;

(c) performing an fMRI on the brain of said second subject following administration of said analgesic; and

(d) comparing the results of said fMRI on the brain of said first subject with the results of said fMRI on the brain of said second subject, wherein non-identical results indicate that said gene of interest or its product is a target for analgesic therapy.

49. The method of claim 48, wherein, in said second non-human subject, both endogenous alleles of said gene of interest are functionally disrupted or deleted.

50. The method of claim 48, wherein said first subject and said second subject are rodents.

51. The method of claim 48, wherein said analgesic is a channel blocker, antidepressant, μ-opioid receptor agonist, κ-opioid receptor agonist, cannabinoid receptor agonist, nicotinic receptor agonist, or adrenergic receptor agonist.

52. The method of claim 48, wherein said analgesic is morphine.

53. The method of claim 48, wherein, prior to step (a), said first and said second non-human subjects are administered a painful stimulus.

54. The method of claim 48, wherein said first subject and said second subject are conscious.